SERVICE MANUAL

MODEL SM-02
SATMETER

DAGATRONICS CORPORATION

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1. PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

1-1. GENERAL

This section contains the Procedures required to check and maintain specified instrument performance.

1-2. EQUIPMENT'S REQUIRED

Table 1-1 is shown test equipment's required.

Table 1-1 Equipment's required

No.	Equipment name	Specification	Remark
1.	75 ohm SWEEP SYSTEM CALIBRATOR	900 to 2100 MHz	
2.	LOAD	150mA	
2.	RF LEVEL DETECTOR		
3.	MULTIMETER		
4.	POWER INJECTOR, DC BLOCK	with series capacitor shorted is satisfactory	
5.	DC POWER SUPPLY		
6.	75 ohm TERMINATION		

1-3. PERFORMANCE CHECK AND ADJUSTMENT

1-3-1. Determine the charge state of the internal Ni-Cd battery pack as follows;

a. Switch unit on, press battery indicator. Needle must be in green and above 16 volts scale to continue. If not, discharge completely and recharge completely.
b. To discharge completely, Connect an LNB which draws approximately 150mA to antenna connector. switch unit on and to 18V position. Check current is being drawn by switching to current position. leave for 3 hours. Check battery pack is in discharged state.
c. To recharge completely, With the unit switched OFF. Connect charger (24V 100mA OUTPUT) to 220VAC supply and connect charger out put to rear connector of unit. Leave overnight.

1-3-2. Determine output voltage as follows;

a. Connect LNB load to antenna connector via a power injector. Switch unit on and set to 18V position.
b. After 2 minutes, measure output voltage at power injector. Verify it is within specification(17.0-19.5V). If not, discharge and recharge as described in 1-3-1 b and c.
c. Switch unit to 13V position output. Verify output voltage at power injector is within specification(12.2-14.2V).

1-3-3. Battery test should be performed as below;

a. Discharge and recharge battery as described in 1-3-1 b and c.
b. Connect **LNB load(150mA)** to **antenna connector** via a power injector for monitoring LNB voltage.
c. Switch unit on and set to 18V position.
d. Verify output voltage after 120 minutes is within specification(>16.0V).

1-3-4. Adjust and Check changeover voltage(VER/HOR) as follows;

a. Connect Power supply set to 15.0V to Receiver connector.
b. Adjust "SFR3" to changeover VER to HOR (yellow/V LED goes out and the red/H LED comes on).
c. Set THE power supply voltage to 14.0V.
d. Verify yellow/V LED is illuminated.

e. Gradually increase power supply voltage until the yellow/V LED goes out and the red/H LED comes on.
e. Verify the voltage at which this occurs is within specification(14.5-15.5V).

1-3-5. Adjust voltage indicated meter accuracy as follows;
a. Connect power supply set to 15.0V to Receiver connector.
b. Switch unit on and to set to 13V position. Press LNB volts button.
c. Adjust "SFR 2" for indicating "15.0V" on METER.

1-3-6. Adjust current indicated meter accuracy as follows;
a. Connect 150mA Load(or LNB which takes a known current at 18V) to antenna connector.
b. Switch unit on and set to 18V position.
c. Push "CURRENT Switch" and adjust "SFR 4" for indicating "150mA(or the current of LNB LOAD)" on METER.

1-3-7. Check meter sensitivity as follows;
a. Connect a signal generator to Antenna connector of unit via a DC block to protect the signal generator from DC voltage. Connect a DC blocking terminal to Receiver connector.
b. Set signal generator to 990 MHz CW, -30 dBm.
c. Switch unit on. Press Level and Tone indicator buttons. Set gain control(VR1) to maximum.
d. Increase generator level in 0.5 dB steps until meter indicates 100% FSD.
e. Verify level is within specification(-27 to -33 dBm).
f. Turn down gain control to verify operation of tone indicator.

1-3-8. Check Saturation level as follows;
a. With equipment set up as in 1-3-7 and set signal generator to 0 dBm.
b. Adjust gain control for a mid-scale reading.
c. Increase generator level in 0.5 dB steps until saturation occurs. Keep needle within range by adjusting gain control. Saturation occurs when the needle does not increase despite an increasing Input level.
d. Verify saturation level is within specification(+ 2 dBm to + 9 dBm).

Table 1-2. Performance Check Sheet

NO.	TEST FUNCTION	SPECIFICATION	RESULT	REMARK
1.	Output voltage (18V at 150mA load)	17.0 - 19.5 V		
2.	Output voltage (13V at 150mA load)	12.2 - 14.2 V		
3.	Battery test(After 120minutes load test)	> 16.0V		
4.	V/H changeover voltage	14.5 - 15.5 V		
5.	Voltmeter accuracy	15V +/- 5 %		
6.	Ammeter accuracy	150mA +/-5%		
7.	Sensitivity(990 MHz)	-27 to -33 dBm		
8.	Saturation level	+2 to +9 dBm		

2. Troubleshooting Procedure

2-1. Troubleshooting techniques

2-1-1. Check the function selector and switch setting. Incorrect switch settings can give a false indication of instrument malfunction. If there is any question about the correct function or operation, Refer to SM-02 OPERATOR'S MANUAL.

2-1-2. Check associated equipment's
Before proceeding, ensure that any equipment's used with SM-02 is operating correctly and verify that out and input signals are properly connected and that the interconnecting cables are not defective.

2-1-3. Visual Check
Look for broken terminals, damaged components, mounting status of components, damaged circuit boards, or other clues to the cause of a malfunction.

2-2. Troubleshooting procedure

2-2-1. No Working ; No lit on "V" LED when switch unit on.
a. Switch unit on and check the "V" LED is lit on.
b. If not, check "POWER Switch", "V LED", "U2" and the connection of LED from main board.
c. Push LNB "V key" on and check the metering reading(higher than 12V).
d. If the meter reading voltage is not appeared, check the Panel Meter and cable connection. And if the reading voltage is less than 12V, Check the output of Battery pack. And recharge the battery according to paragraph 1-3-1 b and c.
e. If the output voltage of battery pack is higher than 12V, check the operation of "U5".

2-2-2. Battery Check Function
a. Push "BATT" key on and check the meter reading is in GREEN ZONE and the output voltage at "ANT" terminal is higher than 12V.
b. If the meter reading voltage is not appeared, check the Panel Meter and cable connection. And if the meter reading is less than green zone, check the output of Battery pack. And recharge the battery according to paragraph 1-3-1 b and c.
c. If the output voltage of battery pack is higher than 12V, check the operation of "D2","D3".

2-2-3. "LNB mA" Check Function
a. Connect the load(150mA) to "ANT" terminal and push "LNB mA" Key on.
b. Check the meter reading is within "150mA ± 5%".
c. If not, check the cable connection and the operation of R30, R1, L3, SFR4, U1.

2-2-4. Level Control Function
a. Push "LEVEL" key on and connect "990MHz 25dBm Signal" to "ANT" terminal.
b. Set the "LEVEL CONTROL" for reading full scale on meter.
c. Check the DC level at Pin1 of U1(approx. 900mVDC).
d. If not, check the operation of U1, D1, M1, M2.
e. Vary the "LEVEL CONTROL" to counter clock wise and check the meter reading is moving to the full scale direction.
f. If not, check the operation of Volume and AGC circuit(U1).

2-2-5. Buzzer Sound

a. Push "LEVEL" and "BUZZER( ) "key on and connect "990MHz 25dBm Signal" to "ANT" terminal.

b. Set the "LEVEL CONTROL" to MAX. Position. Check the beef sound is heard.

c. Vary the "LEVEL CONTROL" to counter clock-wise and check the frequency of beef sound is changed.

d. If not, check the operation of "U3", "U1" and SFR1.

2-2-6. LNB Voltage selection (13/18V)

a. Check output voltage at "ANT" terminal as follows;

- +12.2 ~ +14.2 V at 13V position
- Higher than +16.0 at 18V position

b. If not, check the operation of 13/18V selector switch and cable connection.

c. Check the output voltage and cable connection of battery.

- R23 : Higher than 16V
- Pin 2 of CN4 ; +12.2 ~ +14.2 V

3. PARTS LIST

Table 3-1 is shown Parts list.

4. CIRCUIT DIAGRAM

Fig. 4-1 is shown Circuit diagram.

5. COMPONENTS LAY-OUT

Fig. 5-1 is shown Components lay-out of main board and front board.

TABLE 3-1 PARTS LIST

1. MAIN BOARD

NO	PART NAME	SPECIFICATION	UNIT	Q'TY	REF.NUMBER	REMARK
01	I.C.	MAR-1/MAR-2/MAR-6	EA	2	M1,2	
02	I.C.	LM358/KA358	EA	2	U1,2	
03	I.C.	MC14046/CD4046	EA	1	U3	
04	I.C.	MC7808/KA7808	EA	1	U5	
05	I.C.	LM317/KA317	EA	1	U4	
06	DIODE.DETEC.	1SS99	EA	1	D1	
07	DIODE.SWITCHING	1N4148	EA	2	D4,5	
08	DIODE.RECTIFIER	1N4003	EA	3	D2,3,6	
09	RESISTOR,SEMI FIXED	500, B (Φ 10.0)	EA	1	SFR4	
10	RESISTOR,SEMI FIXED	10 K, B (Φ 10.0)	EA	2	SFR1,2	
11	RESISTOR,SEMI FIXED	220 K, B (Φ 10.0)	EA	1	SFR3	
12	RESISTOR,CHIP(SMD)	22 ohm, 1/8W, J	EA	3	R21,23,30	
13	RESISTOR,CHIP(SMD)	33 ohm, 1/8W, J	EA	2	R2,3	
14	RESISTOR,CHIP(SMD)	75 ohm, 1/8W, J	EA	2	R1 x 2	
15	RESISTOR,CHIP(SMD)	220 ohm, 1/8W, J	EA	1	R25	
16	RESISTOR,CHIP(SMD)	620 ohm, 1/8W, J	EA	2	R36,37	
17	RESISTOR,CHIP(SMD)	680 ohm, 1/8W, J	EA	1	R17	
18	RESISTOR,CHIP(SMD)	1 Kohm, 1/8W, J	EA	3	R4,7,24	
19	RESISTOR,CHIP(SMD)	2.7 Kohm, 1/8W, J	EA	1	R12	
20	RESISTOR,CHIP(SMD)	3.3 Kohm, 1/8W, J	EA	1	R11	
21	RESISTOR,CHIP(SMD)	4.7 Kohm, 1/8W, J	EA	5	R8,14,33,34,35	
22	RESISTOR,CHIP(SMD)	8.2 Kohm, 1/8W, J	EA	1	R15	
23	RESISTOR,CHIP(SMD)	10 Kohm, 1/8W, J	EA	1	R26	
24	RESISTOR,CHIP(SMD)	15 Kohm, 1/8W, J	EA	1	R32	
25	RESISTOR,CHIP(SMD)	18 Kohm, 1/8W, J	EA	1	R27	
26	RESISTOR,CHIP(SMD)	56 Kohm, 1/8W, J	EA	1	R13	
26	RESISTOR,CHIP(SMD)	100 Kohm, 1/8W, J	EA	3	R6,22,29	
27	RESISTOR,CHIP(SMD)	180 Kohm, 1/8W, J	EA	1	R28	
28	RESISTOR,CHIP(SMD)	220 Kohm, 1/8W, J	EA	4	R5,9,10,16	
29	RESISTOR,M/F	0.33 ohm, 1W, J	EA	1	R01	
30	CAPACITOR,ELECTRICAL	22 uF, 16V	EA	3	C7,10,16	
31	CAPACITOR,ELECTRICAL	47 uF, 25V	EA	1	C15	
32	CAPACITOR,CHIP	47pF, 50V	EA	1	C1	
33	CAPACITOR,CHIP	1nF, 50V	EA	2	C2,5	
34	CAPACITOR,CHIP	10nF, 50V	EA	1	C12	
35	CAPACITOR,CHIP	100nF, 50V	EA	5	C3,4,6,9,11	
36	CAPACITOR,METAL FILM	0.47 uF, 63V (BOX TYPE)	EA	1	C8	
37	CAPACITOR,MONOLITHIC	100 nF, 50V	EA	2	C13,14	
38	INDUCTOR,AXIAL TYPE	0.47 uH (04 TYPE)	EA	3	L3,4,5	
39	INDUCTOR,AXIAL TYPE	10 uH (04 TYPE)	EA	2	L1,2	
40	KEY SWITCH	LTP 105 TFC (6 KEY)	EA	1	FUNCTION S.W	
41	DC POWER JACK	6.2 Φ	EA	1	JK	
42	PTC	RXE 050	EA	1	PTC	
43	BUZZER	PIEZO TYPE, Φ 22	EA	1	B.Z	
44	PCB	FR4 , 96 x 144 mm	EA	1		

2. OTHERS

NO	PART NAME	SPECIFICATION	UNIT	Q'TY	REF.NUMBER	REMARK
1	LED	Φ 3.0 , RED	EA	1	LED1	
2	LED	Φ 3.0 , YELLOW	EA	1	LED2	
3	RESISTOR,VARIABLE	10 K, B (Φ 16.0)	EA	1	FRONT(VR1)	
4	SLIDE SWITCH	DSA-2202 B050	EA	1	FRONT	
5	PANEL METER	100uA , 1.2 Kohm	EA	1	FRONT	
6	BATTERY,RECHARGABLE	AA550mA,NI-CD,(1.2Vx15)	EA	1		
7	SHIELD CABLE	RG-179B 100mm with "F" Connector	EA	1	RECEIVER	
8	SHIELD CABLE	RG-179B 130mm with "F" Connector	EA	1	ANT IN	
9	LEAD WIRE ASS'Y	2P , 90 mm	EA	1	METER-CN3	
10	LEAD WIRE ASS'Y	2P , 150 mm	EA	1	BATTERY-CN4	
11	LEAD WIRE ASS'Y	3P , 90 mm	EA	1	LED-CN2	
12	LEAD WIRE ASS'Y	3P , 150 mm	EA	1	VR-CN1	
13	LEAD WIRE	60 mm	EA	1	SLIDE S.W-BATT.	
14	WAFER	2P 2.54mm	EA	2	CN3,4	
15	WAFER	3P 2.54mm	EA	2	CN1,2	
16	HEAT TUBE	Φ 3.0 x 12 mm	EA	2	BATTERY	
17	TOP CASE	0.5T SPCC	EA	1		
18	BOTTOM CASE	0.8T SPCC	EA	1		
19	BATTERY HOLDER	0.8T SPCC	EA	1		
20	TILT STAND	SWRM Φ3.0,Cr COATING	EA	1		
21	MOUNTING POLE	Φ 3.0 , 34.3 mm	EA	1		
22	TOP PLATE	0.35T P.C.,147 x 56 mm	EA	1		
23	KNOB, BUTTON	ABS, 7(W)x7(D)x14(H) mm	EA	6		
24	KNOB, LEVEL	ABS, Φ10 x 125mm	EA	1		
25	SCREW, TAPPING	T 3x5, BH, BLACK COATED	EA	8	TOP CASE	
26	SCREW, TAPPING	T 3x8, BH, BLACK COATED	EA	1	BATTERY	
27	SCREW, MACHINE	M 3x5, BH, Ni-Pl	EA	3	PCB	
28	SCREW, MACHINE	3x5, BH(H6), Ni-Pl	EA	1	MOUNTING POLE	
29	SCREW, MACHINE	2x5, F(H3.7) Zn-Pl	EA	2	SLIDE S/W	
30	INSULATION TAPE	2.0T, 25 x 50 mm	EA	2	BATTERY	
31	CABLE TIE	1x100mm	EA	2		
32	STICKER	Ø12	EA	1		
33	STICKER	16 x 45 mm S/N(+),STD	EA	1		
34	CARRING CASE	POLYVINYL	EA	1		
35	Operating Manual	SM-02	EA	1		
36	Battery Charger	230VAC50Hz, 24VDC100mA	EA	1		

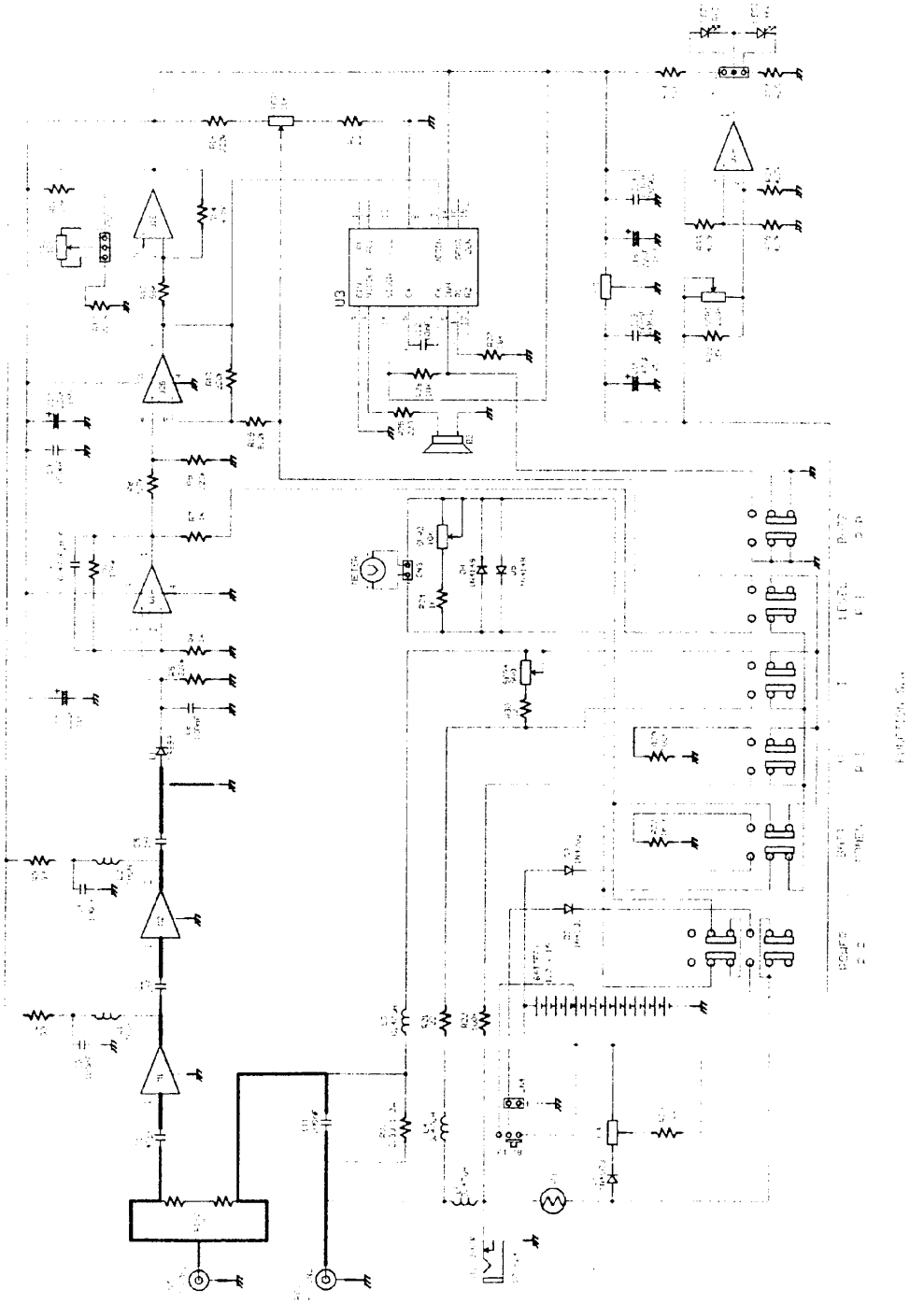


FIG. 4-1. SM-02 CIRCUIT DIAGRAM

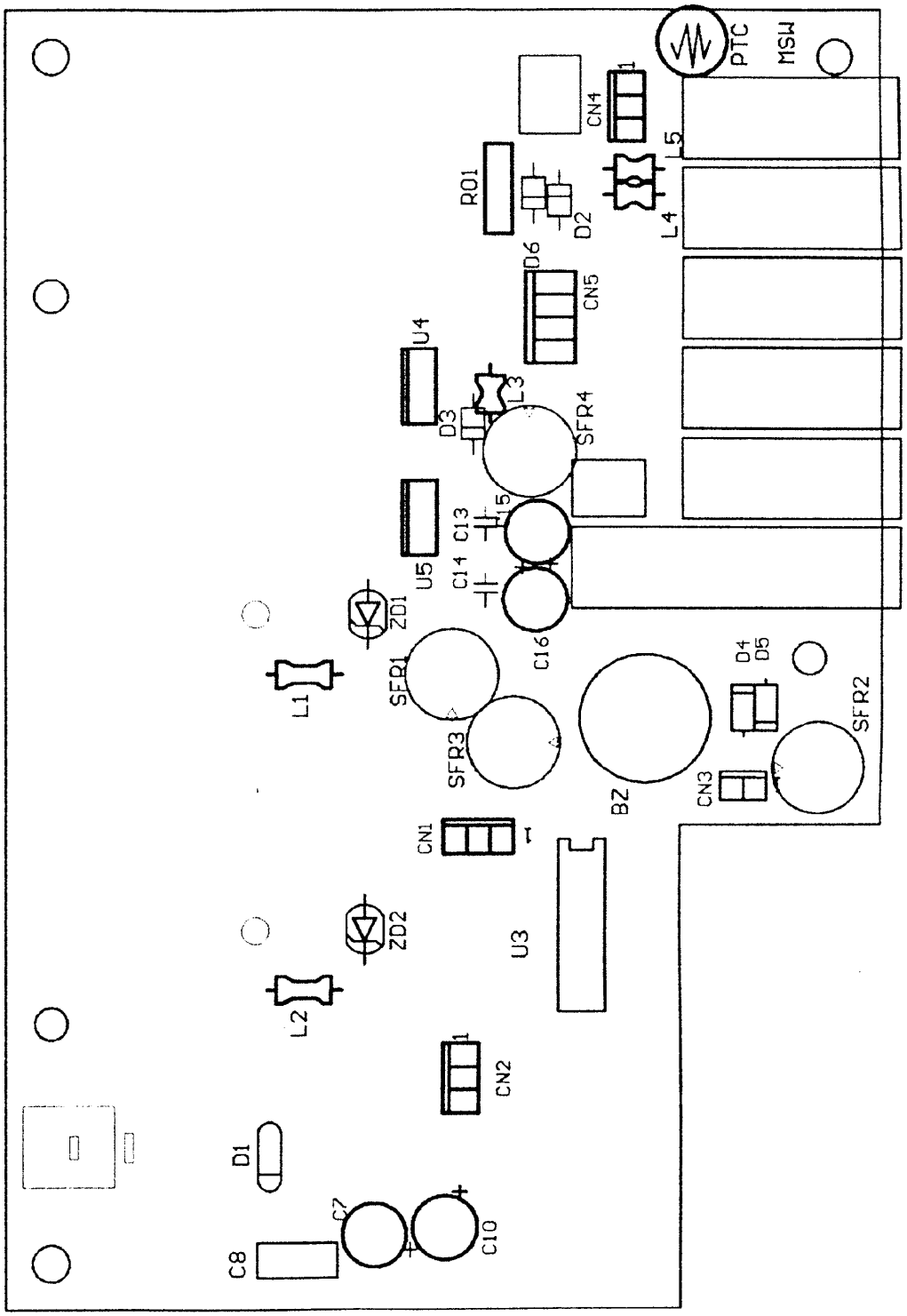
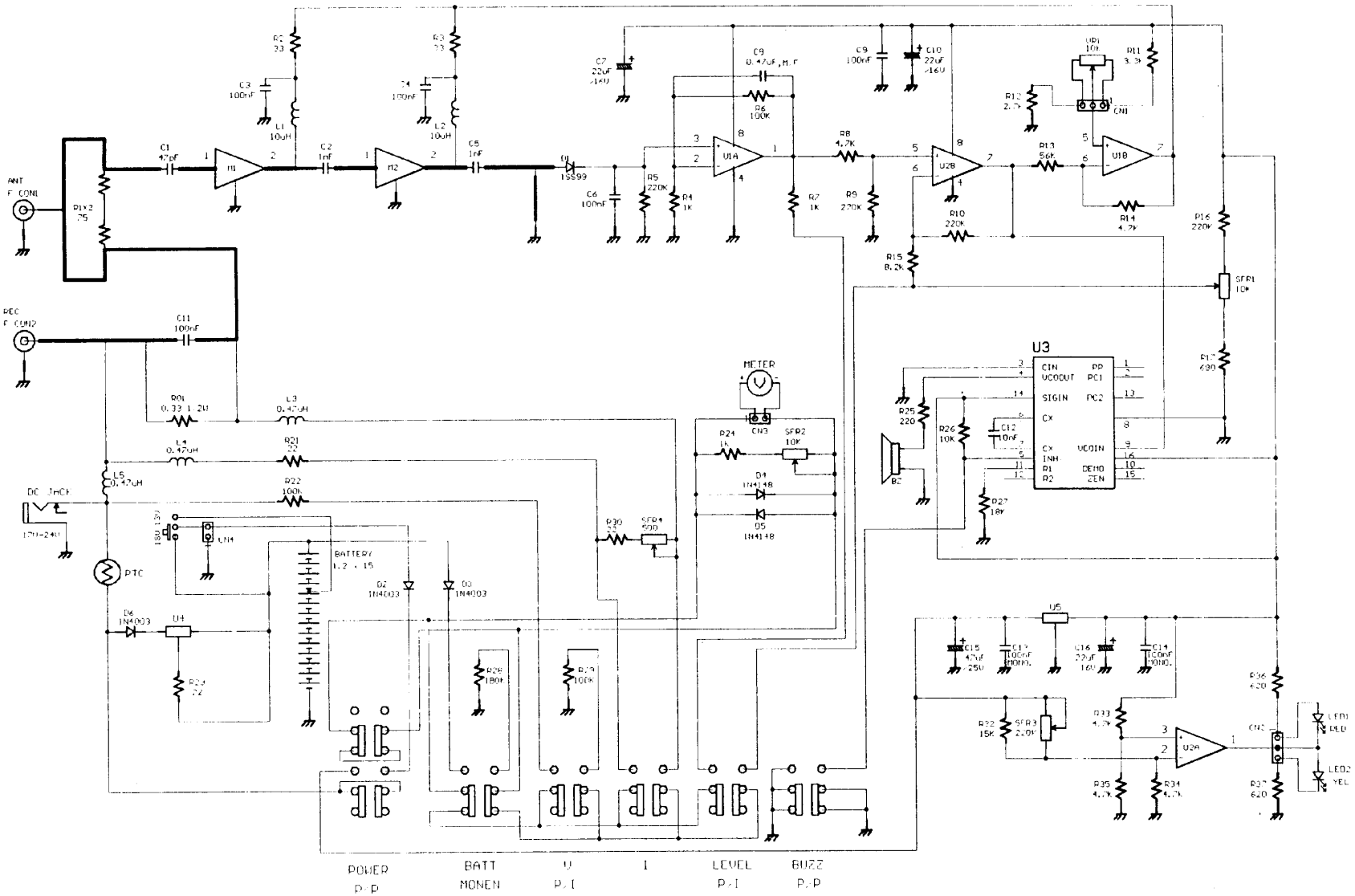


FIG. 5-1 COMPONENTS LAY-OUT

BIN 289957



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